Electrode Consumption, Arc Time and Welding Time

Electrode or wire mass for a weld metal mass from deposition efficiency, arc time from deposition rate, and total time from operating factor.

Method: Mass balance with deposition efficiency and operating factor (Lincoln Electric, Procedure Handbook of Arc Welding)

Input parameters

Unit system: SI

Parameter	Value	Unit
Weld metal required	10.000	kg
Deposition efficiency	60.000	%
Deposition rate	1.5000	kg/h
Operating factor (arc-on time share)	30.000	%

Calculated results

Parameter	Value	Unit
Electrode or wire mass	16.667	kg
Arc time	6.6667	h
Total welding time	22.222	h

Notes for this case

• Typical deposition efficiencies: SMAW 55–65 % (stubs, flux, spatter), FCAW 80–85 %, GMAW 90–95 %, SAW about 99 % of wire. Operating factor: manual 20–40 %, semi-automatic 30–50 %, mechanised 50–80 %.

Formula and method

$$m_e = \frac{m_w}{\eta_d}, \quad t_a = \frac{m_w}{\dot{m}_d}, \quad t = \frac{t_a}{OF}$$

Variables

m_w	Weld metal required	kg
η_d	Deposition efficiency	-
$\dot{m}_d$	Deposition rate	kg/s
OF	Operating factor (arc-on time share)	-
m_e	Electrode or wire mass	kg
t_a	Arc time	s
t	Total welding time	s

Method and standards

Mass and time balance.

Assumptions and limits

- Average rates.

References

• Mass balance with deposition efficiency and operating factor (Lincoln Electric, Procedure Handbook of Arc Welding)

Report details

Report reference	FCC-4B9C-D2VM (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/materials/welding/electrode-consumption-deposition

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.